



US009636019B2

(12) **United States Patent**  
**Hendler et al.**

(10) **Patent No.:** **US 9,636,019 B2**  
(45) **Date of Patent:** **May 2, 2017**

(54) **DEVICE FOR USE IN  
ELECTRO-BIOLOGICAL SIGNAL  
MEASUREMENT IN THE PRESENCE OF A  
MAGNETIC FIELD**

(75) Inventors: **Talma Hendler**, Tel Aviv (IL);  
**Mordekhai Medvedovsky**, Beer-Sheva  
(IL); **Andrey Zhdanov**, Helsinki (FI);  
**Ilana Klovatch**, Petah Tikva (IL); **Firas  
Fahoum**, Tel Aviv (IL)

(73) Assignee: **THE MEDICAL RESEARCH,  
INFRASTRUCTURE, AND HEALTH  
SERVICES FUND OF THE  
TEL-AVIV MEDICAL CENTER**, Tel  
Aviv (IL)

(\*) Notice: Subject to any disclaimer, the term of this  
patent is extended or adjusted under 35  
U.S.C. 154(b) by 693 days.

(21) Appl. No.: **13/878,297**

(22) PCT Filed: **Oct. 6, 2011**

(86) PCT No.: **PCT/IL2011/000785**

§ 371 (c)(1),

(2), (4) Date: **Apr. 8, 2013**

(87) PCT Pub. No.: **WO2012/046237**

PCT Pub. Date: **Apr. 12, 2012**

(65) **Prior Publication Data**

US 2013/0204122 A1 Aug. 8, 2013

**Related U.S. Application Data**

(60) Provisional application No. 61/390,722, filed on Oct.  
7, 2010, provisional application No. 61/445,080, filed  
on Feb. 22, 2011.

(51) **Int. Cl.**

**A61B 5/05** (2006.01)

**A61B 5/00** (2006.01)

(Continued)

(52) **U.S. Cl.**

CPC ..... **A61B 5/0055** (2013.01); **A61B 5/0476**  
(2013.01); **A61B 5/0478** (2013.01); **A61B**  
**2562/222** (2013.01)

(58) **Field of Classification Search**

CPC ..... **A61B 2562/222**; **A61B 5/0055**; **A61B**  
**5/0476**; **A61B 5/0478**

See application file for complete search history.

(56) **References Cited**

**U.S. PATENT DOCUMENTS**

3,998,213 A \* 12/1976 Price ..... **A61B 5/0424**  
600/383  
5,479,934 A \* 1/1996 Imran ..... **A61B 5/0017**  
600/390

(Continued)

**FOREIGN PATENT DOCUMENTS**

WO 99/22642 A1 5/1999

**OTHER PUBLICATIONS**

Srivastava et al. "ICA-based procedures for removing bal-  
listocardiogram artifacts from EEG data acquired in the MRI  
scanner." *NeuroImage* 24 (2005), 50-60.\*

(Continued)

*Primary Examiner* — Jonathan Cwern

*Assistant Examiner* — Amelie R Gillman

(74) *Attorney, Agent, or Firm* — Browdy and Neimark,  
PLLC

(57) **ABSTRACT**

A device is presented for use in an EEG measurement  
performed in the presence of a magnetic field. The device  
includes a wiring array for connecting an electrodes arrange-  
ment to an electroencephalogram (EEG) monitoring device.  
The wiring array includes sampling lines arranged to form  
first and second groups of sampling lines, arranged in a  
spaced-apart substantially parallel relationship extending  
along first and second axes respectively, at least some of the

(Continued)

